

WE CLAIM:

1 1. A flexible circuit comprising:
2 a substrate having a plane;
3 a flexible and extensible structure formed within said substrate and co-planar with
4 said substrate; and
5 wherein said structure is adapted to be extended out of said plane by a distance
6 greater than a maximum lateral dimension of said structure.

1 2. The flexible circuit according to Claim 1 further comprising a pathway formed on
2 said structure.

1 3. The flexible circuit according to Claim 2, wherein said pathway is a capillary for
2 transferring a fluid.

1 4. The flexible circuit according to Claim 2, wherein said pathway is an electrical
2 lead for transferring an electronic signal.

1 5. The flexible circuit according to Claim 2, wherein said pathway is an electrical
2 lead for transferring an electrical signal.

1 6. The flexible circuit according to Claim 2, wherein said pathway is an optical fiber
2 for transferring an optical signal.

1 7. The flexible circuit according to Claim 6, wherein bending radii of said optical
2 fiber are large enough to prevent substantial optical loss from said optical fiber.

1 8. The flexible circuit according to Claim 1, wherein said structure is a spiral.

1 9. The flexible circuit according to Claim 8, wherein said spiral is an Archimedes
2 spiral.

1 10. The flexible circuit according to Claim 8, wherein said spiral is a parabolic spiral.

1 11. The flexible circuit according to Claim 8, wherein said spiral is a polygonal spiral.

1 12. The flexible circuit according to Claim 11, wherein said spiral is one of a square
2 spiral, a triangular spiral, a pentagonal spiral and a hexagonal spiral.

1 13. The flexible circuit according to Claim 1, wherein said structure has geometric
2 features selected from a group comprising spiral, bend, curve, twist, turn, curl, loop, u-turn and
3 zig-zag.

1 14. The flexible circuit according to Claim 1, wherein said structure is defined by
2 perforations.

1 15. The flexible circuit according to Claim 1, wherein said structure comprises a boss
2 for receiving a force to extend said structure out of said plane.

1 16. The flexible circuit according to Claim 1 further comprising at least a first
2 pathway and a second pathway.

Patent Application

1 17. A flexible circuit comprising:
2 a substrate having a plane;
3 a flexible and extensible structure formed within said substrate and co-planar with
4 said substrate, said flexible and extensible structure is adapted to be extended out of said plane
5 by a distance greater than a maximum lateral dimension of said structure; and
6 a pathway on said structure.

1 18. The flexible circuit according to Claim 17, wherein said pathway is a capillary for
2 transferring a fluid.

1 19. The flexible circuit according to Claim 17, wherein said pathway is an electrical
2 lead for transferring an electronic signal.

1 20. The flexible circuit according to Claim 17, wherein said pathway is an optical
2 fiber for transferring an optical signal.

1 21. The flexible circuit according to Claim 20, wherein bending radii of said optical
2 fiber are large enough to prevent substantial optical loss from said optical fiber.

1 22. The flexible circuit according to Claim 17, wherein said structure is a spiral.

1 23. The flexible circuit according to Claim 22, wherein said spiral is an Archimides
2 spiral.

1 24. The flexible circuit according to Claim 22, wherein said spiral is a parabolic
2 spiral.

1 25. The flexible circuit according to Claim 22, wherein said spiral is a polygonal
2 spiral.

1 26. The flexible circuit according to Claim 25, wherein said spiral is one of a square
2 spiral, a triangular spiral, a pentagonal spiral and a hexagonal spiral.

1 27. The flexible circuit according to Claim 17, wherein said structure has geometric
2 features selected from a group comprising spiral, bend, curve, twist, turn, curl, loop, u-turn and
3 zig-zag.

1 28. The flexible circuit according to Claim 17, wherein said structure is defined by
2 perforations.

1 29. The flexible circuit according to Claim 17 wherein said structure comprises a boss
2 for receiving a force to extend said structure out of said plane.

- 1 30. The flexible circuit according to Claim 17 further comprising a second pathway
2 on said structure.

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1 31. A method of manufacturing a fluidic flexible circuit comprising:
2 forming a trench in an upper surface of a first sheet;
3 locating a second sheet on said upper surface of said first sheet, thereby covering
4 at least a portion of said trench to form a capillary;
5 wherein said first sheet and said second sheet form a substrate;
6 forming a pattern in said substrate, said pattern formed in a shape that defines an
7 extensible structure, said extensible structure adapted to be extended out of said plane by a
8 distance greater than a maximum lateral dimension of said structure, said extensible structure
9 carrying said capillary.

1 32. The method of Claim 31, wherein said step of forming a pattern includes forming
2 a groove formed in said substrate.

1 33. The method of Claim 31, wherein said step of forming a pattern includes forming
2 a series of perforations formed in said substrate.

1 ³⁴
2 35. An assembly comprising:
3 a target volume;
4 a substantially planar structure adjacent to said target volume, said structure
5 having a boss;
6 a pin for engaging said boss for selectively forcing said boss out of a plane
7 defined by said substantially planar structure and forcing said boss into contact with said target
8 volume.

1 ³⁵
2 36. The assembly according to Claim 16, wherein said target volume comprises a
3 sample well containing a sample fluid.